

Bureau of Ocean Energy Management
Environmental Studies Program

Quarterly Report

Latest Reports and Study Profiles Posted to the
Environmental Studies Program Information System (ESPIS)



BOEM
Bureau of Ocean Energy
Management

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The Environmental Studies Program (ESP) Quarterly Reports include summaries of the Bureau of Ocean Energy Management (BOEM) environmental studies completed each quarter. These studies inform BOEM’s policy decisions on the development of energy and mineral resources on the Outer Continental Shelf (OCS).

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Demography and Behavior of Polar Bears Summering on Shore in Alaska (Beaufort, Chukchi)

ALASKA REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/26818>

Conducted by: U.S. Fish and Wildlife Service, U.S. Geological Survey, Alaska Science Center

National Studies List: AK-09-05

Study Products (available in ESPIS): Final report, technical summary, related publications

Purpose/Information Use:

Global climate change is anticipated to significantly alter habitat and lead to shifts in species' distributions. Polar bears in northern Alaska are increasingly using onshore habitat during summer and autumn due to sea ice loss, leading to more incidents of conflict and concerns for human safety. This study sought to understand the relative influence of sea ice conditions, habitat characteristics, and human activities on the distribution and abundance of polar bears while onshore. Based on 15 years (2000–2014) of aerial survey data, researchers estimated the weekly (late August to late October) number and distribution of polar bears onshore in northern Alaska as a function of sea ice conditions, onshore habitat, and subsistence whaling activities. Results highlight a potential strategy for reducing human-bear conflict in the region, while accounting for environmental factors that also influence the distribution and number of bears.

A prototype ear-mounted radiotelemetry tag (model Sirtrack KiwiSat 202) recovered on a polar bear in the Chukchi Sea subpopulation on 14 April 2016.



Findings/Results:

- The weekly number of bears onshore was strongly related to sea ice conditions, with more bears onshore when ice was further from the coastline and when ice extent was reduced over the continental shelf.
- The distribution of bears onshore was most strongly affected by the date of sea ice retreat and the presence of whale carcasses, with more bears occurring in areas with earlier ice retreat dates and the presence a whale carcass.
- Findings suggest that potential management strategies for moving or disposing whale carcasses could reduce the estimated number of bears adjacent to the community of Kaktovik by approximately 70%.

Study Products

Regehr EV, St Martin M, Perham C, Wilson RR, Miller S. 2016. Demography and behavior of polar bears summering on shore in Alaska. Final report. Anchorage (AK): U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-020. 73 p.

Identifying Sources of Organic Matter to Benthic Organisms in the Beaufort and Chukchi Outer Continental Shelves

ALASKA REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100131>

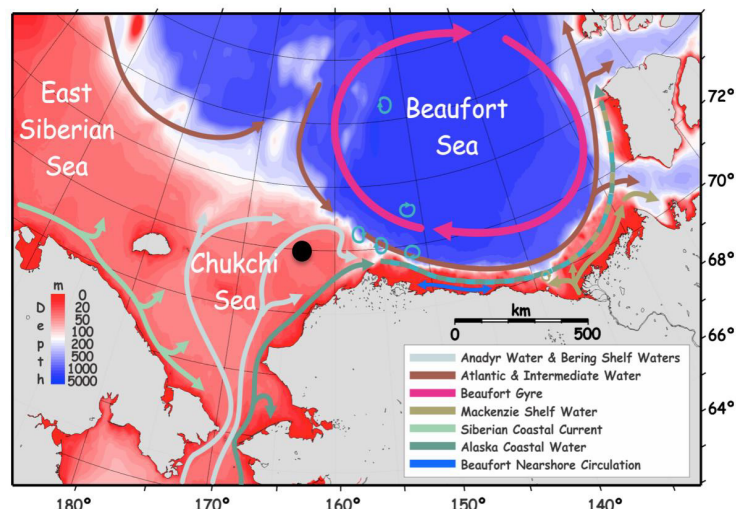
Conducted by: University of Alaska Fairbanks

National Studies List: AK-13-03-15

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

Benthic (bottom-dwelling) invertebrate communities are an essential ecosystem component in Arctic food webs in terms of energy transfer to higher levels of the food web and mineralization. Currently, the proportional contributions of different sources of organic matter (marine, terrestrial, or microbial production) that sustain benthic organisms in the Arctic are unclear. This study provided BOEM with a better understanding of the organic matter sources consumed by benthic organisms using a state-of-the-art essential amino acid (EAA) “fingerprinting” approach. EAA fingerprints allow the separation of microbial and terrestrial carbon sources from marine production, filling a gap identified in previous benthic food web work involving systems in the Arctic.



Locations of the Beaufort and Chukchi Seas and their major oceanographic influences (courtesy of Seth Danielson).

Findings/Results:

- Archived benthic invertebrates were analyzed from three regions: Hanna Shoal, Chukchi Sea, and Beaufort Sea.
- In the Hanna Shoal and Chukchi samples, which came from a relatively uniform water depth, the study found that phytoplankton- and terrestrial-derived EAAs made the greatest proportional contributions to benthic invertebrates. This finding supports observations of highly productive phytoplankton blooms in the region.
- In contrast to the Chukchi region and Hanna Shoal, the results from the Beaufort region indicated a greater contribution of EAAs from sources other than phytoplankton and terrestrial organic matter. Most notably, there appeared to be a greater contribution of bacterial and macroalgal sources of EAAs in the invertebrates. Additionally, water depth influenced the source of the proportional contributions, with more bacterial-derived EAAs at greater depth.

Study Products

Wooller MJ, Iken K, O'Brien D. 2019. Identifying sources of organic matter to benthic organisms in the Beaufort and Chukchi outer continental shelves. Anchorage (AK): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-030. 48 p.

Coastal Community Vulnerability Index and Visualizations of Change in Cook Inlet, Alaska

ALASKA REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100200>

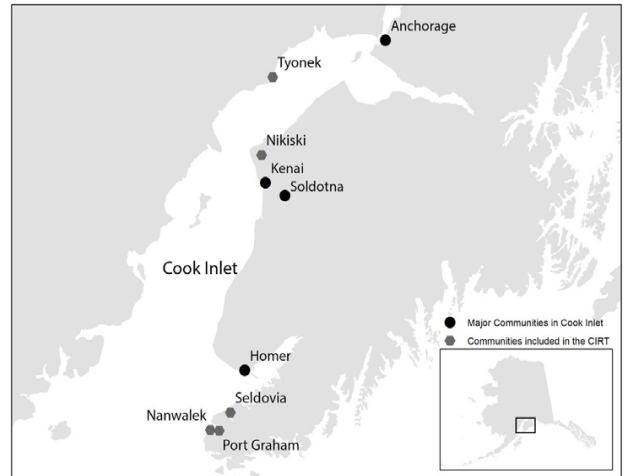
Conducted by: University of Alaska Fairbanks

National Studies List: AK-13-03-21

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

The Cook Inlet Response Tool (CIRT) is a web-based data integration and visualization tool designed to assist in planning for oil and gas extraction activities in the region and to improve outcomes in the event of a technological disaster (e.g., an oil spill) caused by human error in controlling technology or a malfunction of a technology system. The CIRT is available on the Alaska Ocean Observing System (AOOS) data portal and brings together data to provide oil and gas planners and disaster responders with crucial up-to-date information. This project, with BOEM funding, further expanded the capabilities of CIRT by creating an integrated human-dimension data layer titled Wild Resource Harvest and Use by Cook Inlet Communities under the socio-economic category of the CIRT data catalog. The new capabilities make the CIRT more useful to area tribal organizations and their environmental departments by including their harvest and use data.



Cook Inlet region and communities included in the project.

Findings/Results:

- The new layer reflects one calendar year of harvest activity data for each of the following communities: 2013 for Tyonek and 2014 for Nanwalek, Nikiski, Port Graham, and Seldovia.
- Harvest is displayed by community; resource category such as salmon, shellfish, or non-salmon fish; month of harvesting activity; method of access, such as boat or ATV; method of harvest, such as rod and reel fishing or dip net; and amount harvested, shown as intensity of use.
- The new layer shows areas of vulnerability for human populations that use Cook Inlet for harvesting wild resources. In the event of a technological disaster in Cook Inlet, a region with active oil and gas drilling and heavy ship traffic, this tool would help responders mitigate environmental damage in areas shown to be most important for the harvest of wild resources.

Study Products

Holen D. 2019. Coastal community vulnerability index and visualizations of change in Cook Inlet, Alaska. Anchorage (AK): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-031. 23 p

Estimation of Abundance and Demographic Rates of Pacific Walruses Using a Genetics-based Mark-Recapture Approach

ALASKA REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100105>

Conducted by: U.S. Fish and Wildlife Service

National Studies List: AK-16-06

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

The Pacific walrus ranges from the Chukchi Sea to the Bering Sea and utilizes sea ice for multiple life history events, including birthing, breeding, and resting. Walruses follow the seasonal patterns of ice formation and retreat in the Pacific Arctic and sub-Arctic regions. The northeast Chukchi Sea contains areas with high oil and gas resource potential, which are near areas with high levels of walrus use. Consequently, BOEM needs robust estimates of Pacific walrus population numbers, survival rates, and reproduction rates to use in planning, management, and mitigation of potential environment impacts from oil and gas activities in the Chukchi Sea. Pacific walrus population estimates have previously been derived from aerial surveys, which have resulted in imprecise estimates. Genetic mark-recapture offers one alternative approach to estimating the number of Pacific walruses.



Findings/Results:

- USFWS collected 2,156 tissue samples comprising 1,878 unique walruses for a genetic mark-recapture dataset in 2017. In addition, 3,426 individual walruses were sampled for the age structure survey in 2017.
- In 2017, the age structure of the population was 18% calf, 33% juveniles, and 50% adult females.
- In total, USFWS collected 9,354 tissue samples on research cruises from 2013–2017. Researchers identified 8,303 unique walruses with a sample matching algorithm that identified within- and among-year recapture events. USFWS observed relatively high within-year recapture rates, ranging from 6% to 9%.
- The total estimated population size in 2014 was 283,213, although these numbers should be interpreted with caution because several model assumptions were violated in the dataset.

Study Products

Beatty WS, Lemons PR, Sethi SA, Everett J, Lewis CJ, Olsen JB, Lynn RJ, Cook GM, Garlich-Miller JL, Wenburg JK. 2019. Estimation of abundance and demographic rates of Pacific walruses using a genetics-based mark-recapture approach. Anchorage (AK): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-059. 25 p.

Assessment of Spatially-Explicit Social Values Relative to Offshore Wind Energy Areas in the Carolinas

ATLANTIC REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100086>

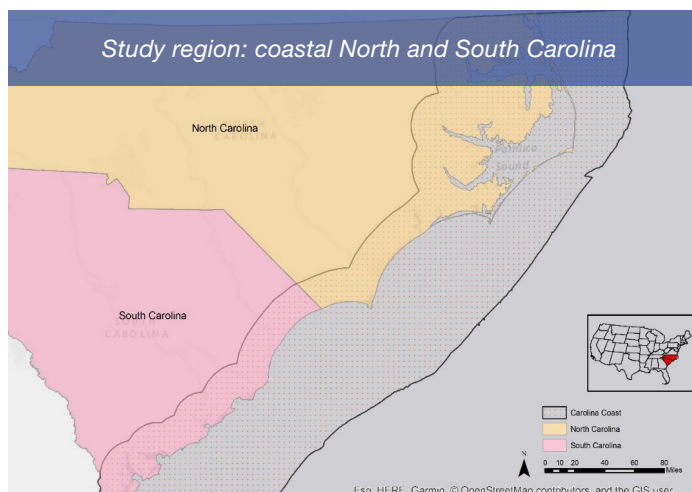
Conducted by: National Oceanic and Atmospheric Administration, National Centers for Coastal Ocean Science

National Studies List: AT-15-04

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

Americans generally support wind energy, but opposition to local wind energy development is common, and action to oppose projects can hinder planning processes. Outside of official public engagement forums, preferences about offshore wind energy development generally remain unknown for members of the public as well as for groups who may not perceive themselves as stakeholders. Failure to gain the perspective of communities regarding potential benefits or impacts is problematic, particularly when latent stakeholders to local projects emerge late in the planning process. This research offers an approach for understanding what is important to communities and how differing values and perceptions across communities influence local receptivity to proposed development. The results of the study will help BOEM better understand public attitudes to offshore wind development.



Findings/Results:

- There was moderate to strong support for offshore wind, although awareness of offshore wind energy development in the study region was low.
- When people thought that offshore wind will negatively impact marine mammal and sea turtle habitat, they were more likely to oppose its development.
- Conversely, electricity affordability was a key reason for support for local offshore wind energy development, suggesting that residents expected electricity to become less expensive with offshore wind energy development. If this is not the case, then this perception could pose problems for securing or maintaining future support in this region.
- Residents in households located closer to the shoreline were more likely to oppose local offshore wind energy development than residents living farther inland.

Study Products

Goedeke TL, Gonyo SB, Chloe S, Fleming CS, Loerzel JL, Freitag A, Ellis C. 2019. Resident perceptions of local offshore wind energy development: support level and intended action in coastal North and South Carolina. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-054. 100 p.

Analyzing the Potential Impacts to Cultural Resources at Significant Sand Extraction Areas

GULF OF MEXICO REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100038>

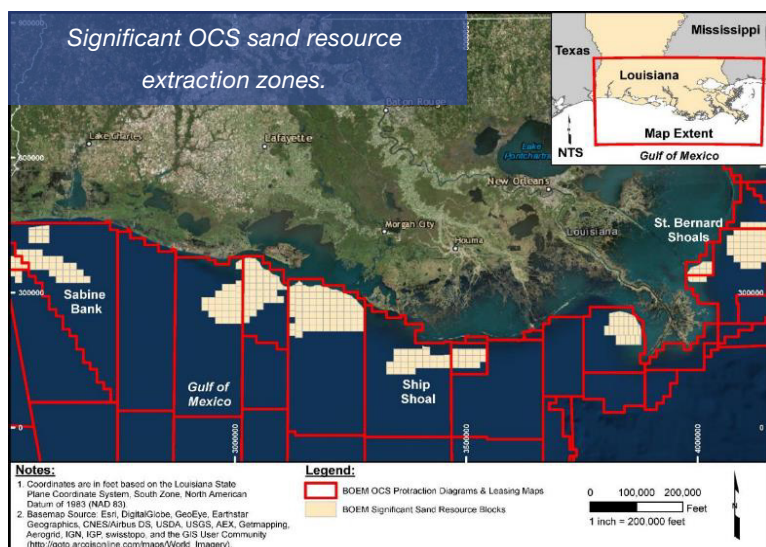
Conducted by: Tidewater Atlantic Research, Inc.

National Studies List: GM-12-04

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

BOEM is required, under Section 106 of the National Historic Preservation Act, to consider the effects of its permitted actions on significant historic properties. Through its Marine Minerals Program, BOEM has designated Significant Outer Continental Shelf (OCS) Sand Resource Extraction Zones, based on sediment thickness, in selected areas of the Gulf of Mexico (GOM). These zones, along with similarly designated zones in Louisiana state waters, may be leased and used as sand sources for coastal restoration and protection projects. Data generated by this study will help BOEM identify potential impacts to shipwreck sites in Significant OCS Sand Resource Extraction Zones. Furthermore, information on the location, preservation, and extents of debris fields associated with vessel remains located in selected sand borrow areas will assist BOEM in determining the most appropriate management strategies and mitigation measures to comply with Section 106 responsibilities.



Findings/Results:

- Several survey sites could serve as valuable sources of data if used as locations for monitoring the impacts of dredging, weather, currents, and sea states.
- Field investigations off the Chandeleur Islands included research to relocate an 18th century ballast pile identified and investigated in 1989. Relocation and identification of the ballast pile provides the opportunity for continued archaeological investigation of what could be the earliest shipwreck in the Mississippi Delta region of the GOM.
- Historical and cartographic research brought to light a considerable amount of new primary source information about the project area. The research also identified a number of previously unknown shipwrecks in the GOM.

Study Products

Watts G, Arnold R, Forrest B, McCoy K, Robertson W. 2019. Analyzing the potential impacts to cultural resources at significant sand extraction areas. Volume I: Technical Report. New Orleans (LA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-013. 296 p.

See also Volumes 2 and 3.

Air Quality Modeling in the Gulf of Mexico Region

GULF OF MEXICO REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100048>

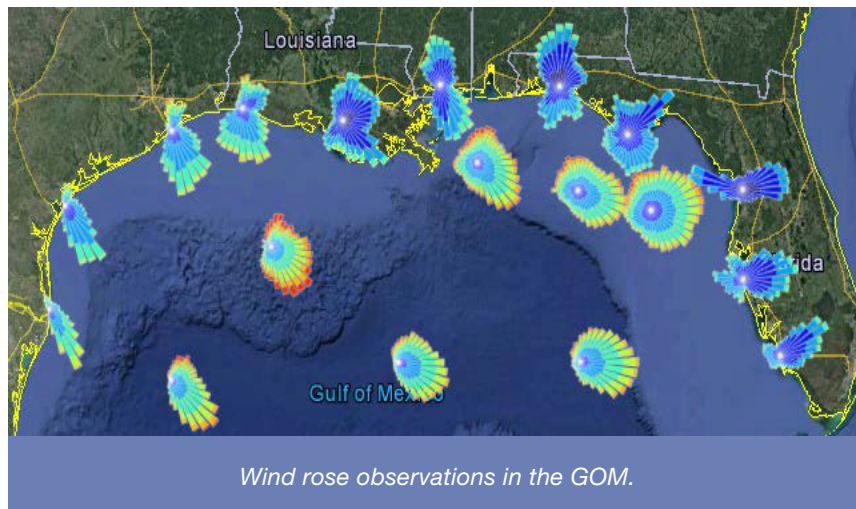
Conducted by: Eastern Research Group, Inc, Ramboll US Corporation, Alpine Geophysics, LLC

National Studies List: GM-14-01

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

BOEM has air quality jurisdiction westward of 87°30'W longitude on the Outer Continental Shelf (OCS) in the Gulf of Mexico Region (GOMR). Under the OCS Lands Act (OCSLA), BOEM is required to prescribe regulations for compliance with the National Ambient Air Quality Standards (NAAQS) to the extent that OCS oil and gas exploration, development, and production sources significantly affect the air quality of any state. In this study, air quality modeling was conducted to assess the existing pre- and potential post-lease impacts from OCS oil and gas development to



the states, as required under OCSLA. BOEM will use this information in National Environmental Policy Act (NEPA) cumulative and visibility analyses and to assess post-lease impacts to determine whether a proposed source could cause or contribute to a violation of the NAAQS.

Findings/Results:

- Ozone levels are projected to decrease from 2012 levels at all air quality monitoring sites in the GOMR due to reductions from other sources.
- A small area off the coast near the Louisiana Offshore Oil Port may experience an increase in ozone, likely due to reductions in nitrogen oxide emissions, which had previously suppressed ozone production in this area.
- Even when considering additional lease sales, the amount of particulate matter (PM_{2.5}) is projected to decrease from 2012 levels at all air quality monitoring sites in the GOMR because of reductions in emissions from other sources.

Study Products

Wilson D, Stoeckenius T, Brashers B, Do B. 2019. Air quality modeling in the Gulf of Mexico Region. New Orleans (LA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-057. 656 p.

Testing and Assessment of the Effects of an Oil Spill on Coastal Archaeological Sites

GULF OF MEXICO REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100052>

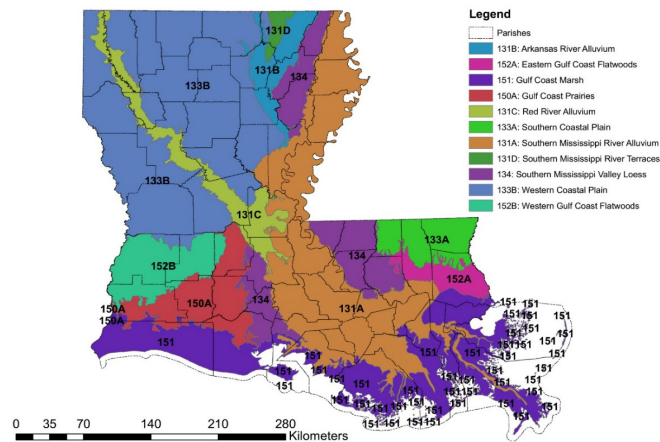
Conducted by: University of Louisiana at Lafayette

National Studies List: GM-12-04

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

This study assessed the effects of the Deepwater Horizon oil spill on Native American archaeological sites on the Louisiana Gulf Coast dating from the Woodland and Mississippi periods (ca. 500 BCE–1700 CE). The study characterized the proximate impacts on the archaeological record, including artifacts, ecofacts, cultural features, and analytic techniques, and to evaluate long-term impacts on formation processes, data collection, analyses, conservation, and curation. Investigators examined the potential for indirect impacts from excavation, cleanup response, remediation, and restoration. The research also provided the Louisiana Office of Cultural Development, Division of Archaeology, and State Historic Preservation Office with information relevant to cultural resources management (CRM) planning and regulatory compliance involving the effects of an oil spill. This supports the BOEM mission of managing offshore oil and gas development in the north-central GOM region by considering the potential effects of an oil spill on cultural resources.



Findings/Results:

- Oil from the Deepwater Horizon oil spill of 2010 and other unknown sources is present at archaeological sites on Louisiana's Gulf Coast, in redeposited shoreline midden and intact cultural deposits.
- CRM planning for oil spill response should consider the increased time and cost expenditures required for working in hazardous conditions and with contaminated collections.
- Pretreatment of radiocarbon samples by solvent extraction should be routine at oiled sites, along with chemical testing for oil.
- The effects of an oil spill on coastal archaeological sites, along with analysis of coastal erosion, subsidence, and relative sea-level rise, should be part of integrated CRM planning.

Study Products

Rees MA, Huey SM, Sorset S. 2019. Assessment of the effects of an oil spill on coastal archaeological sites in Louisiana. New Orleans (LA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-025. 315 p.

USA-Mexico Workshop to Coordinate Future Environmental Studies Related to Ocean Energy Management in the Gulf of Mexico

GULF OF MEXICO REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100191>

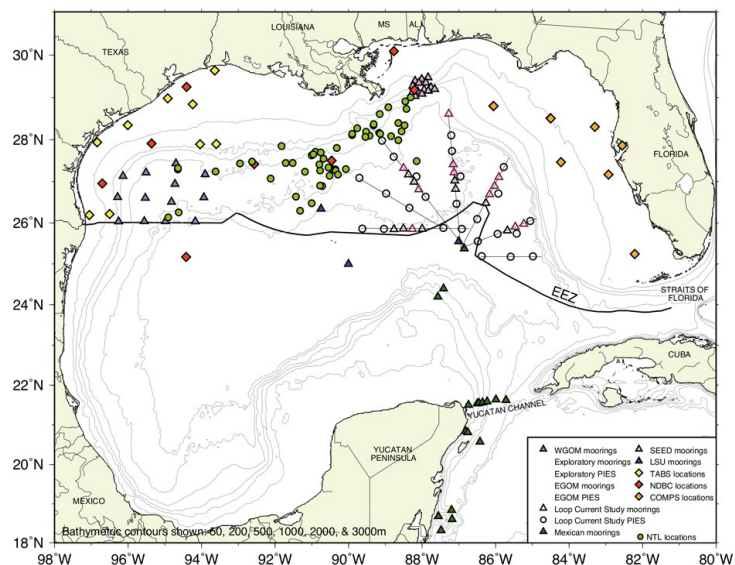
Conducted by: Texas A&M University–Corpus Christi

National Studies List: GM-16-05

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

The US and Mexico both require an understanding of the current state of science in the Gulf of Mexico (GOM), as well as a strategy for engagement on new research projects to inform future offshore energy development activities. Over the past several years, BOEM and Mexico have strengthened their coordination on offshore oil and gas issues. To fill related information gaps, BOEM requires a broader interdisciplinary understanding of research activities (spanning the biological, physical, chemical, and social sciences) in both US and Mexican waters. The overall objective of this study was to convene a workshop of US, Mexican, and Cuban scientists to discuss the current state of science throughout the GOM Large Marine Ecosystem across a range of disciplines, and to develop recommendations for future bi- and trinational research partnerships with relevance to offshore energy activities.



Map of deployed US assets in the GOM after the Deepwater Horizon oil spill.

Findings/Results:

- The study launched the GOM Workshop on International Research (GOMWIR) Inventory and the first GOMWIR Workshop held during in March, 2017, in Houston, Texas.
- Approximately 165 scientists from the US, Mexico, and Cuba with expertise from a broad range of coastal and marine science disciplines participated in the workshop.
- The GOMWIR Inventory contains approximately 900 bibliographic references, primarily focused on the southern GOM, and provides a good framework for future inventory expansion.
- This study expanded the international GOM research community and generated ideas for growing an international network of marine researchers and institutions.

Study Products

McKinney LD, Besonen M, Withers K (editors). 2019. Proceedings: The Gulf of Mexico Workshop on International Research, March 29–30, 2017, Houston, Texas. New Orleans (LA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-045. 225 p.

Disturbance Index Development for the Pacific OCS

PACIFIC REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100115>

Conducted by: Southern California Coastal Water Research Project

National Studies List: PC-16-04

Study Products (available in ESPIS): Final report, technical summary

Purpose/Information Use:

Benthic infauna (animals that live in the ocean floor) are a key ecological component of nearly all marine ecosystems that provide a multitude of ecological services. Due to their sessile lifestyle, they are also the most common faunal assemblage (a group of associated animal fossils found together in a given layer of rock) used to assess habitat quality, which integrates stressors, broad taxonomic diversity with variations in stressor response among taxa, and relatively predictable community-scale changes in both structure and function when exposed to anthropogenic stress. Unlike the continental shelf, comparatively few studies of benthic infauna from Southern California's continental slope ecosystem have occurred since the 1950s. The lack of a modern, comprehensive synthesis of the resident fauna of the continental slope represents a distinct gap in our understanding of the status and health of the region's coastal ocean. Better understanding of the natural infaunal community structure will provide BOEM with more information on which to base assessments of disturbance from human activities.



Map of the Southern California Bight depicting the location of benthic samples collected from the continental slope.

Findings/Results:

- The study identified three distinct, naturally occurring habitats for the Southern California continental slope: the Upper Slope, the Northwest Slope, and the Lower Slope.
- Within the Upper and Lower Slope habitats, researchers detected subtle, community-scale responses to anthropogenic disturbance but were unable to detect any meaningful taxa-specific responses to disturbance.
- Results suggest that oil platforms in Southern California have not significantly impacted the continental shelf habitat around them.

Study Products

Gillett DJ, Gilbane L, Schiff KC. 2019. Benthic infauna of the Southern California Bight continental slope: characterizing community structure for the development of an index of disturbance. Camarillo (CA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-050. 166 p.

Air Emissions Associated with Decommissioning Operations for Pacific Outer Continental Shelf (OCS) Oil and Gas Platforms

PACIFIC REGION

ESPIS Link: <https://marinecadastre.gov/espis/#/search/study/100229>

Conducted by: MRS Environmental, Inc

National Studies List: PC-17-x10

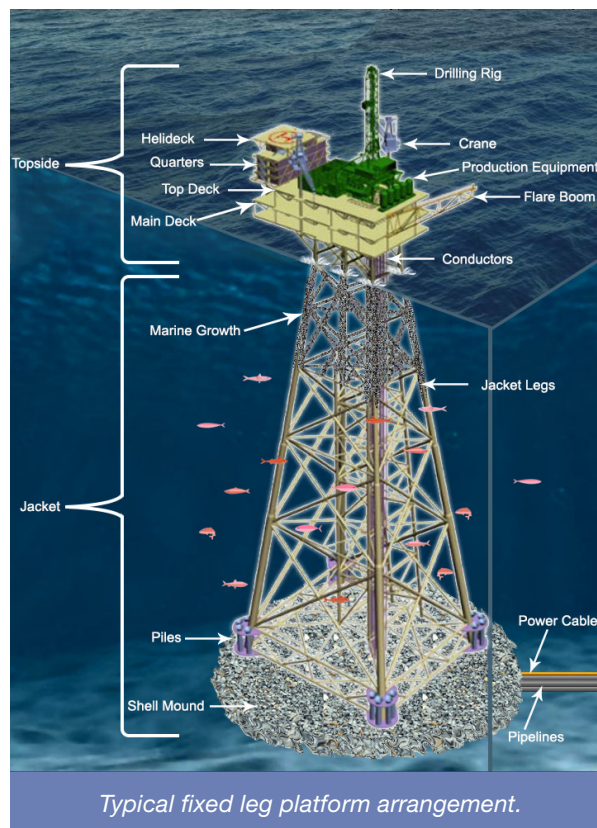
Study Products (available in ESPIS): Final report (two volumes), technical summary, data

Purpose/Information Use:

In Federal waters off the southern California coast, 23 oil and gas production platforms operate in water depths ranging between 96 and 1,197 ft. These platforms have finite life spans and will eventually be decommissioned and removed at the end of their productive life. Current regulations require the complete removal of platform structures and associated debris. In the Pacific Outer Continental Shelf Region, emissions generated by the use of heavy equipment during decommissioning may significantly impact regional air quality. Local air quality regulations require projects that exceed air quality standards to mitigate project emissions below emission thresholds and to ensure a net air quality benefit from the project. Presently, potential emissions and the ability to demonstrate net air quality benefits from these operations are largely unknown. BOEM will require this information to support environmental evaluations and analyses under the National Environmental Policy Act.

Findings/Results:

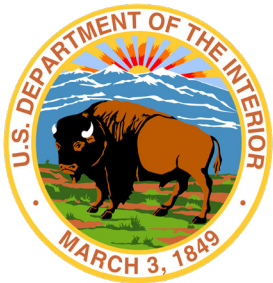
- With the implementation of clean technologies, emissions levels of pollutants associated with the average platform decommissioning construction project would generally be below the current emissions levels associated with the permitted operations of the average platform.
- Partial removal of the jackets (the steel frames that support the platforms) provides substantial reduction in emissions compared to complete removal for deep water platforms, but only a minimal reduction for shallow-water platforms.
- A net air quality benefit to the region could be realized using a decommissioning process that produces less than the platform's permitted annual operational emissions levels.



Study Products

MRS Environmental, Inc. 2019. Air emissions associated with decommissioning operations for Pacific Outer Continental Shelf oil and gas platforms, Volume I: Final Report. Camarillo (CA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-016 Volume I. 136 p.

See also Volume 2.



The Department of the Interior Mission

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.



The Bureau of Ocean Energy Management

The mission of the Bureau of Ocean Energy Management is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

The BOEM Environmental Studies Program

The mission of the Environmental Studies Program (ESP) is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments. The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).

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